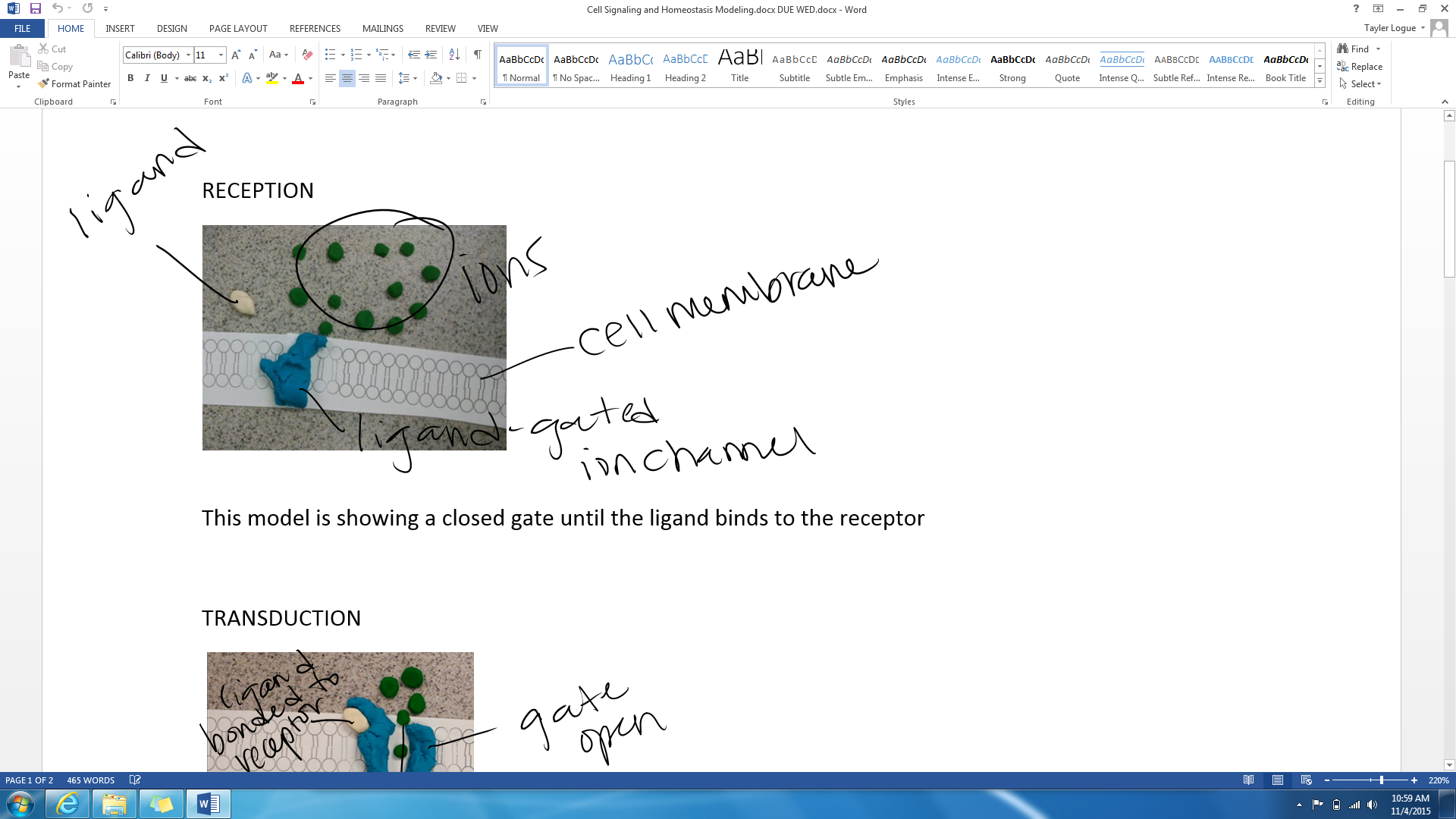
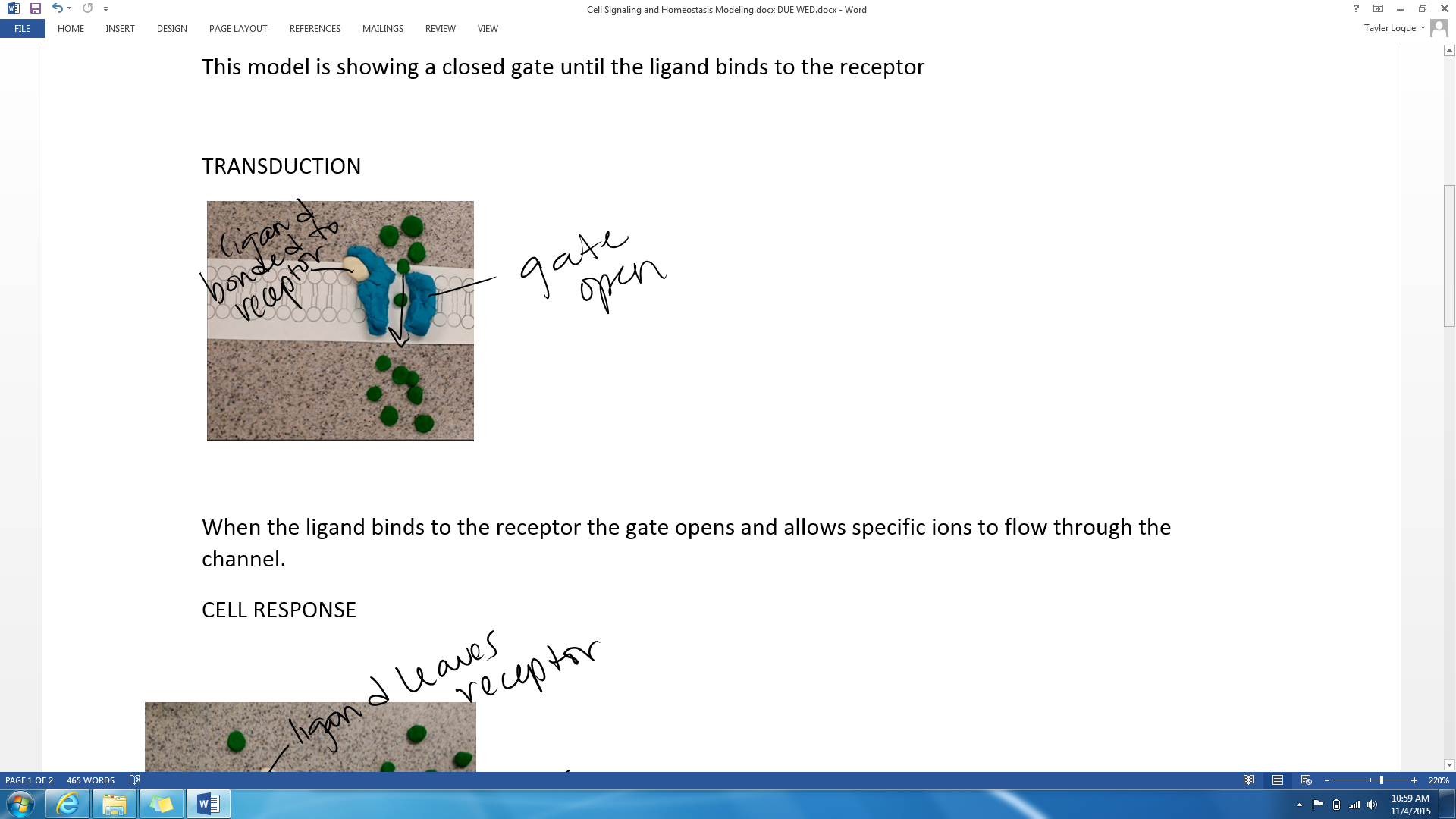
Cell Signaling and Homeostasis Modeling

RECEPTION



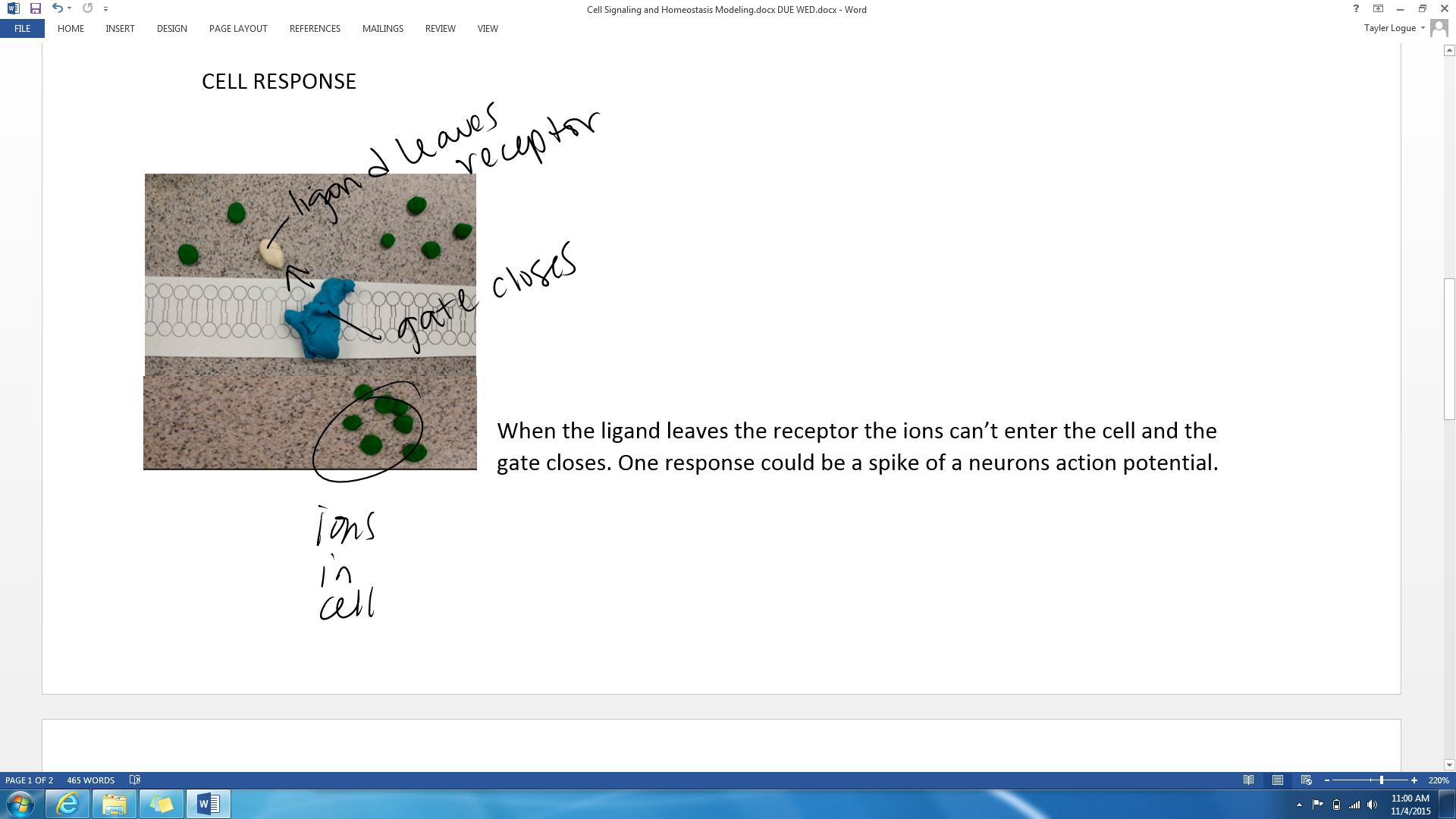
This model is showing a closed gate until the ligand binds to the receptor

TRANSDUCTION



When the ligand binds to the receptor the gate opens and allows specific ions to flow through the channel.

CELL RESPONSE



When the ligand leaves the receptor the ions can’t enter the cell and the gate closes. One response could be a spike of a neurons action potential.

1. They are a widespread cellular mechanism for regulating protein activity. An enzyme that transfers phosphate groups from ATP to a protein is known as a protein kinase. Many of the relay molecules in signal transduction pathways are protein kinases.

2. Secondary messengers activate a protein kinase. The activated protein kinase A then phosphorylates various other proteins.

3. They are called secondary messengers because the “first messenger” is considered to be the extracellular signaling molecule that bids to the membrane receptor, so the next message comes from the second messengers.

4. The term *homeostasis* has traditionally been applied to the internal environment—the extracellular fluid that bathes our tissues—but it can also be applied to conditions within cells. In fact, the ultimate goal of maintaining a constant internal environment is to promote intracellular homeostasis, and toward this end, conditions in the cytosol are closely regulated. The many biochemical reactions within a cell must be tightly regulated to provide metabolic energy and proper rates of synthesis and breakdown of cellular constituents. Metabolic reactions within cells are catalyzed by enzymes and are therefore subject to several factors that regulate or influence enzyme activity. The final product of the reactions may inhibit the catalytic activity of enzymes, end-product inhibition. End-product inhibition is an example of negative-feedback control. Enzymes may be controlled by covalent modification, such as phosphorylation or dephosphorylation. The ionic environment within cells, including hydrogen ion concentration, ionic strength, and calcium ion concentration, influences the structure and activity of enzymes.

5. In endocrine signaling, the signaling molecules (hormones) are secreted by specialized endocrine cells and carried through the circulation to act on target cells at distant body sites. A classic example is provided by the steroid hormone estrogen, which is produced by the ovary and stimulates development and maintenance of the female reproductive system and secondary sex characteristics.

6. The cell membrane by controlling the substances that penetrate the cell, either entering the cell, or leaving the cell. Since the cell membrane is a phospholipid bilayer, it can control the transition of water and ions. Among the plant cell organs are the vacuoles, the largest and main mechanisms for maintaining homeostasis, and chloroplasts, which produce energy.

7. An example of a behavior mechanism is a dog wagging its tail to show it’s excited or needing something. An example of a physiological mechanism is control of body temperature.